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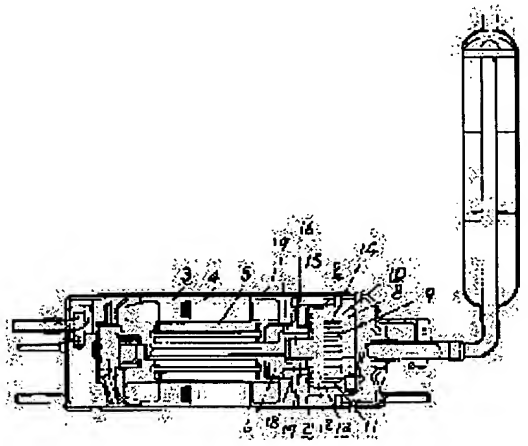
(54) SCROLL COMPRESSOR

(57)Abstract:
PURPOSE: To improve performance and reliability by suppressing the upsetting moment in a scroll compressor.
CONSTITUTION: A sliding partition ring dividing a pressure applied on a rotating panel board 12 back face into a discharging pressure working on the center part, and a pressure, which is lower than the discharge pressure and works on the outer circumference of the panel board 12 back face, is arranged in the outside of a rotary driving engaging part, on the panel board 12 back face, and the center of gravity of the sliding partition ring is eccentric by a half of a turning radius or more that is determined by a fixed scroll fan part 10 and a rotating scroll fan part 13, while the upsetting moment is the greatest or approximately greatest in the eccentric direction.



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CLAIMS

[Claim(s)]
[Claim 1] The revolution swirl wing components which arranged in the interior of a well-closed container the compressor style driven with a motor and this motor, and formed fixed swirl wing components and a revolution swirl wing for said compressor style on the revolution end plate, The rotation restricted components revolved by preventing rotation of this revolution swirl wing component, It constitutes including the bearing article which has the main shaft receptacle which supports the crankshaft which carries out the revolution drive of said revolution swirl wing component, and the main shaft formed in this crankshaft. The revolution drive engagement section which engages with the eccentric drive engagement section prepared in said crankshaft, and carries out the revolution drive of this revolution swirl wing component is prepared in the end plate tooth back of said revolution swirl wing of said revolution end plate, and the opposite side. The pressure applied to a way at said revolution end plate tooth back outside this revolution drive engagement section on said tooth back of an end plate The sliding partition ring which divides into the discharge pressure concerning a core and a pressure lower than said discharge pressure concerning the periphery on said tooth back of an end plate is arranged. The scrolling compressor with which the upsetting moment made the eccentric direction max or the direction which serves as max mostly while the TR determined with said fixed swirl wing component and said revolution swirl wing components carried out or more 1/2 eccentricity of the center of gravity of said sliding partition ring and establishing it.
[Claim 2] The scrolling compressor according to claim 1 with which an upsetting moment comes to prepare this 2nd sliding partition ring in max or the direction which serves as max mostly while forming the plate which carries out the checking and verifying of said sliding partition ring to the revolution end plate tooth-back side of said bearing article and preparing the 2nd sliding partition ring in said plate.
[Claim 3] While preparing two or more said sliding partition rings in concentric circular, the free passage hole of a radial is prepared in said revolution end plate tooth back. To the back pressure space formed with said sliding partition ring prepared in concentric circular, said free passage hole The pressure which considers as the configuration under circular movement 1 rotation of said revolution swirl wing component which carries out a section free passage a part, and acts on said back pressure space The max of an upsetting moment Or the scrolling compressor according to claim 1 it was made to serve as a low pressure from a discharge pressure in a discharge pressure and the other sections in the section which serves as max mostly.

[Claim 4] the shaft-orientations movement restriction flat surface which forms in said bearing article, or fixes to said bearing article, and restricts the movable distance of the shaft orientations on said tooth back of an end plate to a minute fixed clearance -- preparing -- further -- the movable distance on said tooth back of an end plate -- said fixed clearance -- smallness -- the scrolling compressor according to claim 1 which arranged the shaft-orientations movement restriction movable flat surface restricted to a value, and formed the fluid bearing in this shaft-orientations movement restriction movable flat surface.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the reduction approach of the thrust loss at the time of the overthrow control means of a scrolling type compressor, and starting etc.
[0002]
[Description of the Prior Art] The upsetting moment which is going to overthrow revolution swirl wing components in a scrolling compressor with the pressure of the compression workspace formed into a compressor style acts. When revolution swirl wing components are capsized by this upsetting moment, a leak is puffed up, mechanical contact is generated to each part and friction loss is made for the clearance between the compression workspaces formed with fixed swirl wing components and revolution swirl wing components to increase, and to reduce the effectiveness of a compressor or to increase. Then, a discharge pressure, a discharge pressure and suction pressure, or its intermediate pressure is introduced into the tooth back of a revolution end plate, and the prevention approach is proposed in the overthrow so that this upsetting moment may be overcome.
[0003] Moreover, in order to regulate the shaft-orientations movement magnitude of a revolution end plate by an upsetting moment etc., the configuration which prepares a ring-like plate in the tooth back of revolution swirl wing components is seen.
[0004] JP,1-178785,A (electrically-driven compressor) is referred to as this conventional example. Drawing 9 is the principal part cross-sectional view of the scrolling compressor shown in this JP,1-178785,A.
[0005] In drawing, the stator 104 of a motor 103 which drives the compressor style 102 inside a well-closed container 101 is fixed, the crankshaft 106 which drives the compressor style 102 to the rotator 105 of this motor 103 is combined, and the revolving shaft of that crankshaft is arranged almost horizontally. The fixed swirl wing components 110 with which the compressor style 102 formed the fixed swirl wing 109 in the solid-state frame 108 at one, The revolution swirl wing components 113 in which the revolution swirl wing 111 which gears with this fixed swirl wing 109, and forms two or more compression workspaces 114 was formed on the revolution end plate 112, It has the rotation restricted components 115 revolved by preventing rotation of this revolution swirl wing component 113. The revolution driving shaft 116 prepared in

the opposite side in the revolution swirl wing 111 of this revolution end plate 112 It is inserted in the eccentric bearing 118 prepared in the way among the main shafts 117 formed in the end of a crankshaft 106, and this crankshaft 106 is supported in the bearing article 121 which has that main shaft 119. Moreover, the shaft-orientations limit plate 123 which sets the minute clearance 122 from the tooth back of the revolution end plate 112, and restricts a motion of the shaft orientations of the revolution swirl wing components 113 is arranged. Furthermore, at the tooth back of this revolution end plate 112, with this tooth back, it can slide freely, the minute clearance 122 is sealed, and the annular back pressure partition band 124 divided so that a discharge pressure may act and the back pressure pressure lower than it in the back pressure room 125 of the periphery section may act on a core side on the back is arranged.
[0006]
[Problem(s) to be Solved by the Invention] However, although the pressure lower than a discharge pressure and a discharge pressure is made to act on the tooth back of a revolution end plate uniformly in a Prior art which was mentioned above in order to overcome the upsetting moment by the pressure of compression workspace, the pressure of compression workspace changes a lot during 1 rotation, and an upsetting moment also changes in connection with it. The example of the force which pushes the revolution end plate under 1 rotation against fixed swirl wing components at drawing 10 is shown. The drawing solid line and the wavy line show the difference by the pressure concerning a revolution end plate tooth back, the pressure from a tooth back is insufficient and revolution swirl wing components generate an overthrow in the field, i.e., the field in which the thrust force becomes negative, surrounded with the slash of a continuous line. In order to lose this overthrow field, when a tooth-back pressure is raised and is carried out like a dotted line, the thrust force will increase in other fields, as a result, thrust loss increases, and the effectiveness of a compressor is made to fall.
[0007] Moreover, the tooth back of a revolution end plate and the shaft-orientations movement restriction prepared in the shape of a ring generate mechanical contact, and makes the increment in mechanical loss, as a result dependability fall sharply in the condition that the pressure on the tooth backs of a revolution end plate at the time of starting etc. is not stabilized.
[0008]
[Means for Solving the Problem] The technical means for solving the technical problem of the conventional scrolling compressor described above The revolution swirl wing components which arranged in the interior of a well-closed container the compressor style driven with a motor and this motor, and formed fixed swirl wing components and a revolution swirl wing for said compressor style on the revolution end plate, The rotation restricted components revolved by preventing rotation of this revolution swirl wing component, It constitutes including the bearing article which has the main shaft receptacle which supports the crankshaft which carries out the revolution drive of said revolution swirl wing component, and the main shaft formed in this crankshaft. The revolution drive engagement section which engages with the eccentric drive engagement section prepared in said crankshaft, and carries out the revolution drive of this revolution swirl wing component is prepared in the end plate tooth back of said revolution swirl wing of said revolution end plate, and the opposite side. The pressure applied to a way at said revolution end plate tooth back outside this revolution drive engagement section on said tooth back of an end plate The sliding partition ring which divides into the discharge pressure concerning a core and a pressure lower than said discharge pressure concerning the periphery on said tooth back of an end plate is arranged. While the TR determined with said fixed swirl wing component and said revolution swirl wing components carries out or more 1/2 eccentricity of the center of gravity of said sliding partition ring and establishing it, it is that the upsetting moment made the eccentric direction max or the direction which serves as max mostly.
[0009] Moreover, while forming the plate which carries out the checking and verifying of said sliding partition ring to the revolution end plate tooth-back side of said bearing article and preparing the 2nd sliding partition ring in said plate, it is that the upsetting moment prepared this 2nd sliding partition ring in max or the direction which serves as max mostly.
[0010] Moreover, while preparing two or more said sliding partition rings in concentric circular,

the free passage hole of a radial is prepared in said revolution end plate tooth back. To the back pressure space formed with said sliding partition ring prepared in concentric circular, said free passage hole The pressure which considers as the configuration under circular movement 1 rotation of said revolution swirl wing component which carries out a section free passage a part, and acts on said back pressure space is having made it become a low pressure from a discharge pressure in a discharge pressure and the other sections in the max of an upsetting moment, or the section which serves as max mostly.

[0011] the shaft-orientations movement restriction flat surface which forms in said bearing article, or fixes to said bearing article further again, and restricts the movable distance of the shaft orientations on said tooth back of an end plate to a minute fixed clearance -- preparing -- further -- the movable distance on said tooth back of an end plate -- said fixed clearance -- smallness -- it is having arranged the shaft-orientations movement restriction movable flat surface restricted to a value, and having formed the fluid bearing in this shaft-orientations movement restriction movable flat surface.

[0012]

[Function] The operation of this invention is as follows.

[0013] The revolution swirl wing components which arranged in the interior of a well-closed container the compressor style driven with a motor and this motor, and formed fixed swirl wing components and a revolution swirl wing for said compressor style on the revolution end plate, The rotation restricted components revolved by preventing rotation of this revolution swirl wing component, It constitutes including the bearing article which has the main shaft receptacle which supports the crankshaft which carries out the revolution drive of said revolution swirl wing component, and the main shaft formed in this crankshaft. The revolution drive engagement section which engages with the eccentric drive engagement section prepared in said crankshaft, and carries out the revolution drive of this revolution swirl wing component is prepared in the end plate tooth back of said revolution swirl wing of said revolution end plate, and the opposite side. The pressure applied to a way at said revolution end plate tooth back outside this revolution drive engagement section on said tooth back of an end plate The sliding partition ring which divides into the discharge pressure concerning a core and a pressure lower than said discharge pressure concerning the periphery on said tooth back of an end plate is arranged. While the TR determined with said fixed swirl wing component and said revolution swirl wing components carries out or more 1/2 eccentricity of the center of gravity of said sliding partition ring and establishing it When the upsetting moment made the eccentric direction max or the direction which serves as max mostly, an overthrow of a revolution swirl wing can be controlled without increasing the thrust force between fixed swirl wing components and revolution swirl wing components, and decline in the effectiveness of a compressor can be prevented.

[0014] Moreover, while forming the plate which carries out the checking and verifying of said sliding partition ring to the revolution end plate tooth-back side of said bearing article and preparing the 2nd sliding partition ring in said plate An upsetting moment this 2nd sliding partition ring Max Or while being stabilized and being able to make it circle in revolution swirl components, without increasing most aforementioned thrust force by preparing in the direction which serves as max mostly, mechanical contact of a shaft-orientations movement restriction plate and a revolution end plate can be eased, and dependability can be improved.

[0015] Moreover, while preparing two or more said sliding partition rings in concentric circular, the free passage hole of a radial is prepared in said revolution end plate tooth back. To the back pressure space formed with said sliding partition ring prepared in concentric circular, said free passage hole The pressure which considers as the configuration under circular movement 1 rotation of said revolution swirl wing component which carries out a section free passage a part, and acts on said back pressure space The max of an upsetting moment Or by having made it become a low pressure from a discharge pressure in a discharge pressure and the other sections in the section which serves as max mostly Without following change of the upsetting moment under 1 rotation, and increasing thrust loss for the tooth-back pressure of a revolution end plate, since it is controllable, an overthrow can be controlled and the effectiveness of a compressor can be improved.

[0016] The shaft-orientations movement restriction flat surface which forms in said bearing article, or fixes to said bearing article further again, and restricts the movable distance of the shaft orientations on said tooth back of an end plate to a minute fixed clearance is established. furthermore, the movable distance on said tooth back of an end plate -- said fixed clearance -- smallness -- by having arranged the shaft-orientations movement restriction movable flat surface restricted to a value, and having formed the fluid bearing in this shaft-orientations movement restriction movable flat surface While the pressure on the tooth backs of a revolution end plate at the time of starting etc. can support revolution swirl wing components also in an unstable field, the mechanical contact to a revolution end plate and shaft-orientations movement restriction can be prevented, and the improvement in the engine performance of a compressor and improvement in dependability can be aimed at.

[0017]

[Example] as the 1st example of this invention -- drawing 1 -- drawing of longitudinal section of a scrolling compressor, and drawing 2 -- a partial enlarged drawing and drawing 3 -- a principle Fig. is shown in the perspective view of the associated part of the 2nd example, and drawing 5 R> 5 at drawing of longitudinal section of the 3rd example, and drawing 6 , and the Fig. of operation is shown in drawing 4 at the perspective view of an associated part, and drawing 7 .

[0018] The compressor style 2 is fixed to the interior of a well-closed container 1, the stator 4 of a motor 3 which drives this is fixed, and the crankshaft 6 which drives the compressor style 2 to the rotator 5 of this motor 3 is combined. The fixed swirl wing components 10 with which the compressor style 2 has the fixed swirl wing 9 formed in one in the fixed end plate 8, The revolution swirl wing components 13 in which the revolution swirl wing 11 which gears with this fixed swirl wing 9, and forms two or more compression workspaces 14 was formed on the revolution end plate 12, The rotation restricted components 15 revolved by preventing rotation of this revolution swirl wing component 13, The revolution driving shaft 16 prepared in the opposite side of the revolution swirl wing 11 of this revolution end plate 12, The eccentric bearing 17 which prepares in a way among the main shafts 18 of a crankshaft 6, and this revolution driving shaft 16 inserts, The bearing article 21 which has the main shaft receptacle 19 which supports the main shaft 18 of this crankshaft 6, The plate components 24 which have the shaft-orientations movement restriction flat surface 23 which sets the clearance between minute spacing from the revolution end plate tooth back 20 of the tooth back of the revolution end plate 12, and restricts a motion of the shaft orientations of this revolution swirl wing component 13 are arranged. The sliding partition ring 25 which divides the pressure concerning the end plate tooth back 20 into the discharge pressure concerning a core and a pressure lower than the discharge pressure applied at the end plate tooth back 20 is arranged in this plate component 24. TR ro to which this sliding partition ring 25 carries out the revolution drive of the revolution swirl wing components 13 to the center of gravity of the revolution end plate 12 is carrying out or more 1/2 eccentricity of that center-of-gravity location, and that direction is established so that the upsetting moment by the pressure of the compression workspace 14 may serve as max or near max. Since the moment of the direction which opposes an above-mentioned upsetting moment is generated according to the force applied to an end plate tooth back according to this structure even if it uses the sliding partition ring of the diameter of the same mostly with the former, an overthrow of the revolution swirl wing components 13 can be controlled (drawing 3).

[0019] The 2nd example is shown in drawing 4 . The 2nd sliding partition ring 26 is formed in the shaft-orientations movement restriction flat surface 23 of the plate components 24, and the direction is established so that the upsetting moment by the pressure of the compression workspace 14 may serve as max or near max. 27 is a high-pressure pressure installation hole for leading a discharge pressure to a way among this 2nd sliding partition ring.

[0020] The 3rd example is shown in drawing 5 , and 6 and 7. The 2nd sliding partition ring 26 is formed in concentric circular at the periphery of the 1st sliding partition ring 25 prepared on the shaft-orientations movement restriction flat surface 23 of the plate components 24, and the back pressure space 27 is formed at the this 1st and 2nd sliding partition ring 25 and 26, the end plate tooth back 20, and the shaft-orientations movement restriction flat surface 23 of the flat-

surface components 24. 28 is the radial slot established in the end plate tooth back 20 of the revolution end plate 12, when the revolution swirl wing components 13 circle, is open for free passage to the back pressure space 27, and repeats cutoff. At this time, the pressure of the back pressure space 27 is intercepted with the radial slot 28, and becomes whenever [crank angle / from which the revolution swirl wing components 13 serve as the max of an upsetting moment, or near max] with a discharge pressure. Moreover, the radial slot 28 and the back pressure space 27 are open for free passage to whenever [other crank angle], and it becomes a low pressure from a discharge pressure.
[0021] The 4th example is shown in drawing 8 . The movable flat-surface annular components 30 which have the annular shaft-orientations movement restriction flat surface 29 are arranged in the periphery of the flat-surface components 24, and this is supported with the annular spring 31. 32 is a washer which makes smooth contact of the annular spring 31 and the movable flat-surface annular components 30. Moreover, 33 is the fluid bearing of the shape of radii prepared in the end plate tooth-back 20 side of the movable flat-surface annular components 29, when the tooth-back pressures at the time of starting etc. are unstable, generates dynamic pressure and prevents mechanical contact at the end plate tooth back 23 of the revolution end plate 12.
[0022]
[Effect of the Invention] The effectiveness concerning claim 1 of this invention can control an overthrow of a revolution swirl wing, without increasing the thrust force between fixed swirl wing components and revolution swirl wing components, as stated above, and can prevent decline in the effectiveness of a compressor.
[0023] The effectiveness concerning claim 2 of this invention can ease mechanical contact of a shaft-orientations movement restriction plate and a revolution end plate, and can improve dependability while it can be stabilized and it can make it circle in revolution swirl components, without increasing most thrust force.
[0024] Without following change of the upsetting moment under 1 rotation, and increasing thrust loss for the tooth-back pressure of a revolution end plate, since it is controllable, the effectiveness concerning claim 3 of this invention can control an overthrow, and can improve the effectiveness of a compressor.
[0025] The effectiveness concerning claim 4 of this invention can prevent mechanical contact to a revolution end plate and a shaft-orientations movement restriction plate, and can aim at the improvement in the engine performance of a compressor, and improvement in dependability while the pressure on the tooth backs of a revolution end plate at the time of starting etc. can support revolution swirl wing components also in an unstable field.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing of longitudinal section of one example of the scrolling compressor concerning this invention

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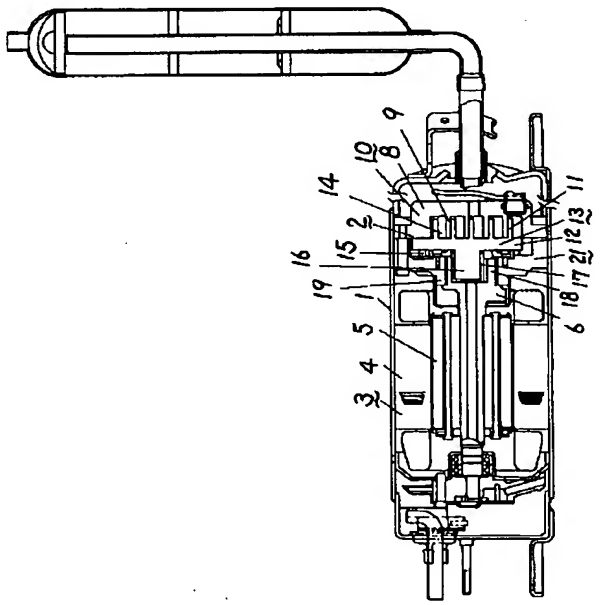
最終頁に続く

(54)【発明の名称】　スクロール圧縮機

(57)【要約】　（修正有）

【目的】　スクロール圧縮機における転覆モーメントを抑制して性能、信頼性の向上を図る。

【構成】　鏡板１２背面のこの旋回駆動係合部の外方に前記旋回鏡板１２背面にかかる圧力を中心部にかかる吐出圧力と前記鏡板１２背面の外周にかかる前記吐出圧力より低い圧力とに仕切る摺動仕切り環を配設し、前記摺動仕切り環の重心を、前記固定渦巻羽根部品１０と前記旋回渦巻羽根部品１３とで決定される旋回半径の２分の１以上偏心させて設けるとともに、その偏心方向を転覆モーメントが最大あるいは、ほぼ最大となる方向とした。



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【特許請求の範囲】

【請求項１】密閉容器の内部に電動機と、この電動機で駆動する圧縮機構を配設し、前記圧縮機構を、固定渦巻羽根部品と旋回渦巻羽根を旋回鏡板の上に形成した旋回渦巻羽根部品と、この旋回渦巻羽根部品の自転を防止して旋回のみを行なわせる自転拘束部品と、前記旋回渦巻羽根部品を旋回駆動するクランク軸と、このクランク軸に形成した主軸を支承する主軸受けを有する軸受け部品を含んで構成し、前記旋回鏡板の前記旋回渦巻羽根と反対側の鏡板背面に、前記クランク軸に設けた偏心駆動係合部に係合してこの旋回渦巻羽根部品を旋回駆動する旋回駆動係合部を設け、前記鏡板背面のこの旋回駆動係合部の外方に前記旋回鏡板背面にかかる圧力を、中心部にかかる吐出圧力と前記鏡板背面の外周にかかる前記吐出圧力より低い圧力とに仕切る摺動仕切り環を配設し、前記摺動仕切り環の重心を、前記固定渦巻羽根部品と前記旋回渦巻羽根部品とで決定される旋回半径の２分の１以上偏心させて設けるとともに、その偏心方向を転覆モーメントが最大あるいは、ほぼ最大となる方向としたスクロール圧縮機。

【請求項２】前記軸受け部品の旋回鏡板背面側に、前記摺動仕切り環を勘合する平面板を設け、前記平面板に第２の摺動仕切り環を設けるとともに、この第２の摺動仕切り環を転覆モーメントが最大あるいは、ほぼ最大となる方向に設けてなる請求項１記載のスクロール圧縮機。

【請求項３】前記摺動仕切り環を同心円状に複数個設けるとともに、前記旋回鏡板背面に放射状の連通孔を設け、前記連通孔は同心円状に設けた前記摺動仕切り環で形成される背圧空間に、前記旋回渦巻羽根部品の旋回運動１回転中の一部区間連通する構成とし、前記背圧空間に作用する圧力は転覆モーメントの最大あるいは、ほぼ最大となる区間においては吐出圧力、またその他の区間においては吐出圧力よりも低い圧力となるようにした請求項１記載のスクロール圧縮機。

【請求項４】前記軸受け部品に形成するか前記軸受け部品に固定して前記鏡板背面の軸方向の移動可能距離を微小な固定隙間に制限する軸方向移動制限平面を設け、さらに、前記鏡板背面の移動可能距離を前記固定隙間よりも小なる値に制限する軸方向移動制限可動平面を配設し、この軸方向移動制限可動平面に流体軸受けを形成した請求項１記載のスクロール圧縮機。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明はスクロール式圧縮機の転覆制御手段と始動時等のスラスト損失の低減方法に関するものである。

【０００２】

【従来の技術】スクロール圧縮機では、圧縮機構の中に形成される圧縮作業空間の圧力により旋回渦巻羽根部品を転覆させようとする転覆モーメントが作用する。この

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転覆モーメントにより旋回渦巻羽根部品が転覆すると、固定渦巻羽根部品と旋回渦巻羽根部品とで形成される圧縮作業空間の隙間が増大し、洩れを増長させて圧縮機の効率を低下させたり、各部に機械的接触を発生して摩擦損失を増大させることになる。そこで、この転覆モーメントに打ち勝つように、旋回鏡板の背面に吐出圧力、吐出圧力と吸入圧力、あるいはその中間圧力等を導入して転覆を防止方法が提案されている。

【０００３】また、転覆モーメント等により旋回鏡板の軸方向移動量を規制するために、リング状のプレートを旋回渦巻羽根部品の背面に設ける構成等が見られる。

【０００４】この従来例として特開平１－１７８７８５号公報（電動圧縮機）を参照する。図９はこの特開平１－１７８７８５号公報に示されたスクロール圧縮機の主要部横断面図である。

【０００５】図において、密閉容器１０１の内部に、圧縮機構１０２を駆動する電動機１０３の固定子１０４が固定され、この電動機１０３の回転子１０５に圧縮機構１０２を駆動するクランク軸１０６が結合されて、そのクランク軸の回転軸をほぼ水平に配置させている。圧縮機構１０２は、固体枠体１０８に固定渦巻羽根１０９を一体に形成した固定渦巻羽根部品１１０と、この固定渦巻羽根１０９と噛み合って複数個の圧縮作業空間１１４を形成する旋回渦巻羽根１１１を旋回鏡板１１２の上に形成した旋回渦巻羽根部品１１３と、この旋回渦巻羽根部品１１３の自転を防止して旋回のみを行なわせる自転拘束部品１１５とを有し、この旋回鏡板１１２の旋回渦巻羽根１１１とは反対側に設けた旋回駆動軸１１６は、クランク軸１０６の一端に形成した主軸１１７の内方に設けられた偏心軸受け１１８に嵌入され、このクランク軸１０６はその主軸１１９を有する軸受け部品１２１で支持されている。また、旋回鏡板１１２の背面から微小隙間１２２をおいて旋回渦巻羽根部品１１３の軸方向の動きを制限する軸方向制限板１２３が配設され、さらにこの旋回鏡板１１２の背面に、この背面とは摺動自在であり、微小隙間１２２を密封して背面の中心側に吐出圧力が作用し、外周部の背圧室１２５にそれよりも低い背圧圧力が作用するように仕切る環状の背圧仕切り帯１２４が配置されている。

【０００６】

【発明が解決しようとする課題】しかし、上述したような従来の技術では、圧縮作業空間の圧力による転覆モーメントに打ち勝つために旋回鏡板の背面に吐出圧力と吐出圧力よりも低い圧力を一定に作用させているが、圧縮作業空間の圧力は１回転中に大きく変化しそれにともない転覆モーメントも変化する。図１０に１回転中の旋回鏡板を固定渦巻羽根部品に押しつける力の例を示す。図中実線と波線とは旋回鏡板背面にかかる圧力による差を示しており、実線の斜線で囲まれた領域つまり、スラスト力が負になる領域では、背面からの圧力が不足し、旋

回渦巻羽根部品が転覆を発生する。この転覆領域をなくすために背面圧力を上昇させて点線のようにすると、その他の領域でスラスト力が増大することになり、その結果スラスト損失が増大し、圧縮機の効率を低下させることになる。

【０００７】また、始動時等の旋回鏡板背面の圧力が安定しない状態においては、旋回鏡板の背面とリング状に設けた軸方向移動制限とが機械的接触を発生し、機械損失の増加、ひいては信頼性を大幅に低下させることになる。

【０００８】

【課題を解決するための手段】以上に述べた従来のスクロール圧縮機の課題を解決する為の技術的手段は、密閉容器の内部に電動機と、この電動機で駆動する圧縮機構を配設し、前記圧縮機構を、固定渦巻羽根部品と旋回渦巻羽根を旋回鏡板の上に形成した旋回渦巻羽根部品と、この旋回渦巻羽根部品の自転を防止して旋回のみを行なわせる自転拘束部品と、前記旋回渦巻羽根部品を旋回駆動するクランク軸と、このクランク軸に形成した主軸を支承する主軸受けを有する軸受け部品を含んで構成し、前記旋回鏡板の前記旋回渦巻羽根と反対側の鏡板背面に、前記クランク軸に設けた偏心駆動係合部に係合してこの旋回渦巻羽根部品を旋回駆動する旋回駆動係合部を設け、前記鏡板背面のこの旋回駆動係合部の外方に前記旋回鏡板背面にかかる圧力を、中心部にかかる吐出圧力と前記鏡板背面の外周にかかる前記吐出圧力より低い圧力とに仕切る摺動仕切り環を配設し、前記摺動仕切り環の重心を、前記固定渦巻羽根部品と前記旋回渦巻羽根部品とで決定される旋回半径の２分の１以上偏心させて設けるとともに、その偏心方向を転覆モーメントが最大あるいは、ほぼ最大となる方向としたことである。

【０００９】また、前記軸受け部品の旋回鏡板背面側に、前記摺動仕切り環を勘合する平面板を設け、前記平面板に第２の摺動仕切り環を設けるとともに、この第２の摺動仕切り環を転覆モーメントが最大あるいは、ほぼ最大となる方向に設けたことである。

【００１０】また、前記摺動仕切り環を同心円状に複数個設けるとともに、前記旋回鏡板背面に放射状の連通孔を設け、前記連通孔は同心円状に設けた前記摺動仕切り環で形成される背圧空間に、前記旋回渦巻羽根部品の旋回運動１回転中の一部区間連通する構成とし、前記背圧空間に作用する圧力は転覆モーメントの最大あるいは、ほぼ最大となる区間においては吐出圧力、またその他の区間においては吐出圧力よりも低い圧力となるようにしたことである。

【００１１】さらにまた、前記軸受け部品に形成するか前記軸受け部品に固定して前記鏡板背面の軸方向の移動可能距離を微小な固定隙間に制限する軸方向移動制限平面を設け、さらに、前記鏡板背面の移動可能距離を前記固定隙間よりも小なる値に制限する軸方向移動制限可動

平面を配設し、この軸方向移動制限可動平面に流体軸受けを形成したことである。

【００１２】

【作用】本発明の作用は以下の通りである。

【００１３】密閉容器の内部に電動機と、この電動機で駆動する圧縮機構を配設し、前記圧縮機構を、固定渦巻羽根部品と旋回渦巻羽根を旋回鏡板の上に形成した旋回渦巻羽根部品と、この旋回渦巻羽根部品の自転を防止して旋回のみを行なわせる自転拘束部品と、前記旋回渦巻羽根部品を旋回駆動するクランク軸と、このクランク軸に形成した主軸を支承する主軸受けを有する軸受け部品を含んで構成し、前記旋回鏡板の前記旋回渦巻羽根と反対側の鏡板背面に、前記クランク軸に設けた偏心駆動係合部に係合してこの旋回渦巻羽根部品を旋回駆動する旋回駆動係合部を設け、前記鏡板背面のこの旋回駆動係合部の外方に前記旋回鏡板背面にかかる圧力を、中心部にかかる吐出圧力と前記鏡板背面の外周にかかる前記吐出圧力より低い圧力とに仕切る摺動仕切り環を配設し、前記摺動仕切り環の重心を、前記固定渦巻羽根部品と前記旋回渦巻羽根部品とで決定される旋回半径の２分の１以上偏心させて設けるとともに、その偏心方向を転覆モーメントが最大あるいは、ほぼ最大となる方向としたことにより、固定渦巻羽根部品と旋回渦巻羽根部品間のスラスト力を増加することなく旋回渦巻羽根の転覆を抑制することができ、圧縮機の効率の低下を防止することができる。

【００１４】また、前記軸受け部品の旋回鏡板背面側に、前記摺動仕切り環を勘合する平面板を設け、前記平面板に第２の摺動仕切り環を設けるとともに、この第２の摺動仕切り環を転覆モーメントが最大あるいは、ほぼ最大となる方向に設けることにより、前記のスラスト力をほとんど増加することなく旋回渦巻部品を安定して旋回させることができるとともに、軸方向移動制限板と旋回鏡板の機械的接触を緩和することができ、信頼性を向上することができる。

【００１５】また、前記摺動仕切り環を同心円状に複数個設けるとともに、前記旋回鏡板背面に放射状の連通孔を設け、前記連通孔は同心円状に設けた前記摺動仕切り環で形成される背圧空間に、前記旋回渦巻羽根部品の旋回運動１回転中の一部区間連通する構成とし、前記背圧空間に作用する圧力は転覆モーメントの最大あるいは、ほぼ最大となる区間においては吐出圧力、またその他の区間においては吐出圧力よりも低い圧力となるようにしたことにより、１回転中の転覆モーメントの変化に追従して旋回鏡板の背面圧力を制御可能なためスラスト損失を増加することなく転覆を抑制でき圧縮機の効率を向上することができる。

【００１６】さらにまた、前記軸受け部品に形成するか前記軸受け部品に固定して前記鏡板背面の軸方向の移動可能距離を微小な固定隙間に制限する軸方向移動制限平

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面を設け、さらに、前記鏡板背面の移動可能距離を前記固定隙間よりも小なる値に制限する軸方向移動制限可動平面を配設し、この軸方向移動制限可動平面に流体軸受けを形成したことにより、始動時等の旋回鏡板背面の圧力が不安定な領域においても旋回渦巻羽根部品を支持することができるとともに、旋回鏡板と軸方向移動制限との機械的接触を防止でき、圧縮機の性能向上及び、信頼性の向上がはかれる。

【００１７】

【実施例】本発明の第１の実施例として、図１にスクロール圧縮機の縦断面図、図２に部分拡大図、図３に原理図をまた、図４に第２の実施例の関連部品の斜視図、図５に第３の実施例の縦断面図、図６に関連部品の斜視図、図７にその動作図を示す。

【００１８】密閉容器１の内部に圧縮機構２を固定し、これを駆動する電動機３の固定子４を固定し、この電動機３の回転子５に圧縮機構２を駆動するクランク軸６を結合する。圧縮機構２は、固定鏡板８に一体に形成した固定渦巻羽根９を有する固定渦巻羽根部品１０と、この固定渦巻羽根９と噛み合って複数個の圧縮作業空間１４を形成する旋回渦巻羽根１１を旋回鏡板１２の上に形成した旋回渦巻羽根部品１３と、この旋回渦巻羽根部品１３の自転を防止して旋回のみをさせる自転拘束部品１５と、この旋回鏡板１２の旋回渦巻羽根１１の反対側に設けた旋回駆動軸１６と、クランク軸６の主軸１８の内方に設け、この旋回駆動軸１６が嵌入する偏心軸受け１７と、このクランク軸６の主軸１８を支承する主軸受け１９を有する軸受け部品２１と、旋回鏡板１２の背面の旋回鏡板背面２０から微小な間隔の隙間をおいてこの旋回渦巻羽根部品１３の軸方向の動きを制限する軸方向移動制限平面２３を有する平面板部品２４を配置する。この平面板部品２４に、鏡板背面２０にかかる圧力を中心部にかかる吐出圧力と鏡板背面２０にかかる吐出圧力よりも低い圧力とに仕切る摺動仕切り環２５を配設する。この摺動仕切り環２５はその重心位置を、旋回鏡板１２の重心に対して、旋回渦巻羽根部品１３を旋回駆動する旋回半径ｒｏの１／２以上偏心しており、その方向は圧縮作業空間１４の圧力による転覆モーメントが最大あるいは最大付近となるように設けられている。この構造により、従来とほぼ同一径の摺動仕切り環を用いても鏡板背面にかかる力により、上述の転覆モーメントに対抗する方向のモーメントを発生するため旋回渦巻羽根部品１３の転覆を抑制することができる（図３）。

【００１９】図４に第２の実施例を示す。平面板部品２４の軸方向移動制限平面２３に第２の摺動仕切り環２６が設けられ、その方向は圧縮作業空間１４の圧力による転覆モーメントが最大あるいは最大付近となるように設けられている。２７はこの第２の摺動仕切り環の内方に吐出圧力を導く為の高圧圧力導入孔である。

【００２０】図５、６、７に第３の実施例を示す。平面

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板部品２４の軸方向移動制限平面２３上に設けた第１の摺動仕切り環２５の外周に同心円状に第２の摺動仕切り環２６を設け、この第１、第２の摺動仕切り環２５、２６と鏡板背面２０と平面部品２４の軸方向移動制限平面２３とで背圧空間２７を形成する。２８は旋回鏡板１２の鏡板背面２０に設けた放射状溝であり、旋回渦巻羽根部品１３が旋回運動することにより背圧空間２７に対して連通、遮断を繰り返す。このとき背圧空間２７の圧力は旋回渦巻羽根部品１３が転覆モーメントの最大、あるいは最大付近となるクランク角度において放射状溝２８と遮断され吐出圧力となる。また、その他のクランク角度においては、放射状溝２８と背圧空間２７とが連通し吐出圧力よりも低い圧力となる。

【００２１】図８に第４の実施例を示す。平面部品２４の外周に環状の軸方向移動制限平面２９を有する可動平面環状部品３０を配設し、これを環状ばね３１で支承している。３２は環状ばね３１と可動平面環状部品３０の当接を円滑にするワッシャーである。また３３は可動平面環状部品２９の鏡板背面２０側に設けた円弧状の流体軸受けであり、始動時等の背面圧力が不安定な時に動圧を発生して旋回鏡板１２の鏡板背面２３との機械的接触を防止する。

【００２２】

【発明の効果】本発明の請求項１に係る効果は、上に述べたように、固定渦巻羽根部品と旋回渦巻羽根部品間のスラスト力を増加することなく旋回渦巻羽根の転覆を抑制することができ、圧縮機の効率の低下を防止することができる。

【００２３】本発明の請求項２に係る効果は、スラスト力をほとんど増加することなく旋回渦巻部品を安定して旋回させることができるとともに、軸方向移動制限板と旋回鏡板の機械的接触を緩和することができ、信頼性を向上することができる。

【００２４】本発明の請求項３に係る効果は、１回転中の転覆モーメントの変化に追従して旋回鏡板の背面圧力を制御可能なためスラスト損失を増加することなく転覆を抑制でき圧縮機の効率を向上することができる。

【００２５】本発明の請求項４に係る効果は、始動時等の旋回鏡板背面の圧力が不安定な領域においても旋回渦巻羽根部品を支持することができるとともに、旋回鏡板と軸方向移動制限板との機械的接触を防止でき、圧縮機の性能向上及び、信頼性の向上がはかれる。

【図面の簡単な説明】

【図１】本発明に係るスクロール圧縮機の一実施例の縦断面図

【図２】同要部断面図及び斜視図

【図３】同原理説明図

【図４】本発明に係るスクロール圧縮機の他の実施例の要部斜視図

【図５】本発明に係るスクロール圧縮機の他の実施例の

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要部断面図
【図６】同要部斜視図
【図７】同動作説明図
【図８】本発明に係るスクロール圧縮機のための実施例の要部分解斜視図
【図９】従来例の要部断面図
【図１０】同原理説明図
【符号の説明】
１　密閉容器
２　圧縮機構
３　電動機
４　電動機固定子
５　電動機回転子
６　クランク軸
１０　固定渦巻羽根部品
１１　旋回渦巻羽根

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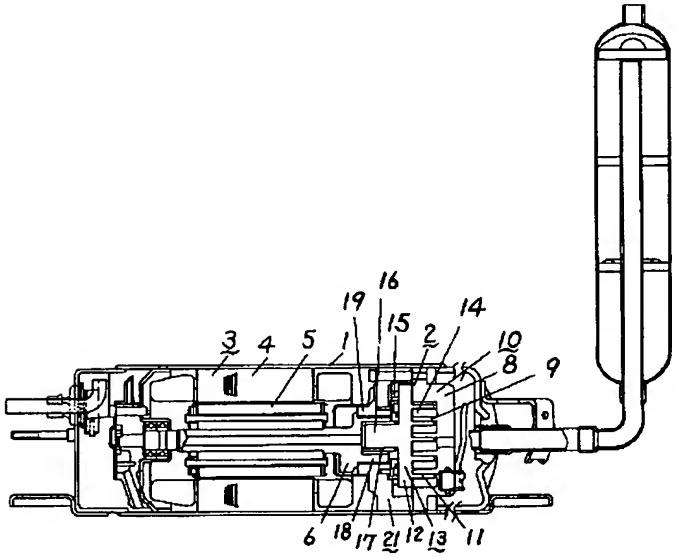
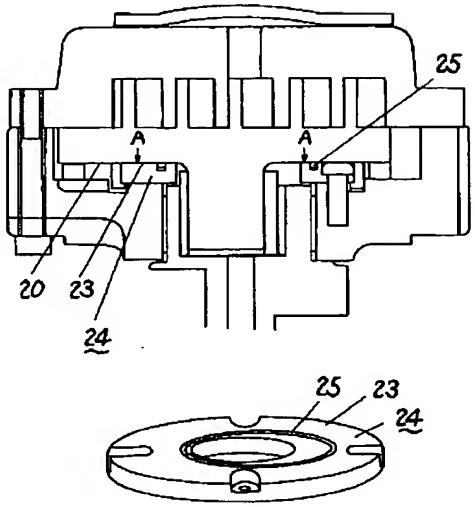
＊１２　旋回鏡板
１３　旋回渦巻羽根部品
１５　自転拘束部品
１８　主軸
１９　主軸受け
２０　鏡板背面
２１　軸受け部品
２３　軸方向移動制限平面
２４　平面板部品
２５　摺動仕切り環
２６　第２の摺動仕切り環
２７　背圧空間
２８　連通孔
２９　軸方向移動制限可動平面
３３　流体軸受け

＊

【図１】



【図２】



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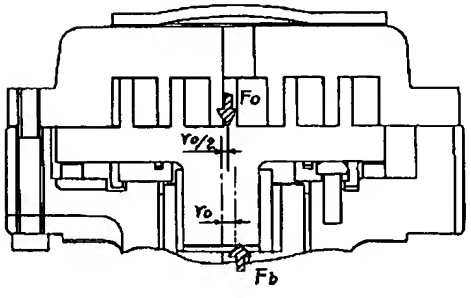

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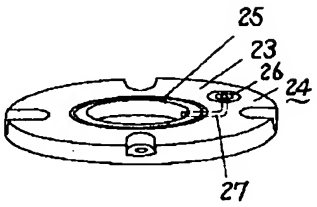

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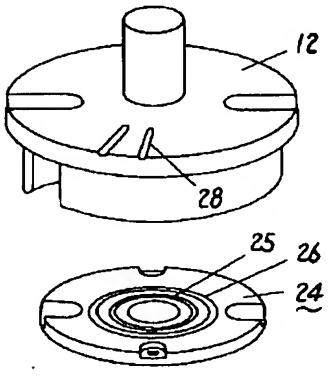

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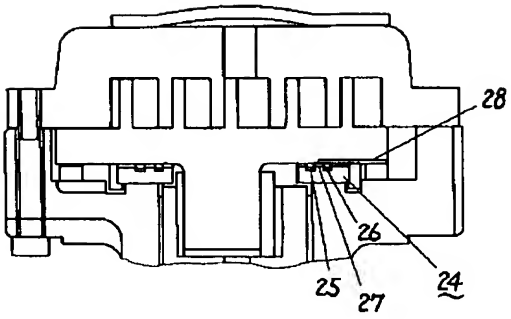

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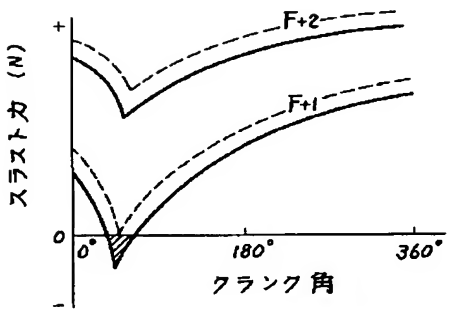

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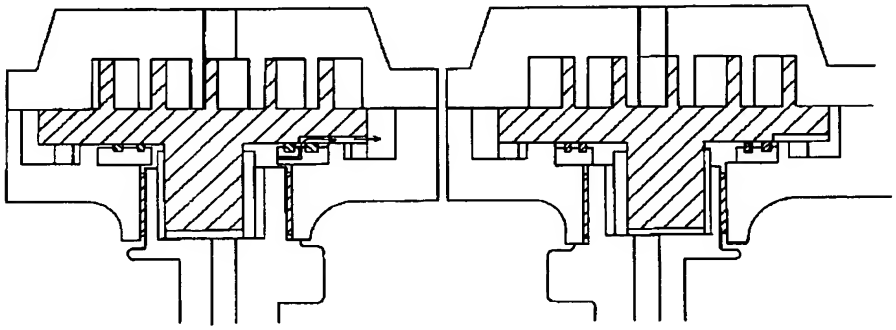

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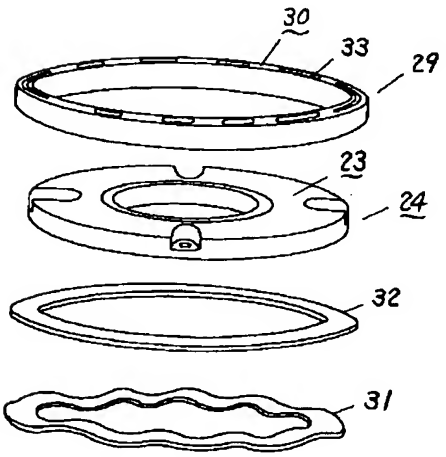

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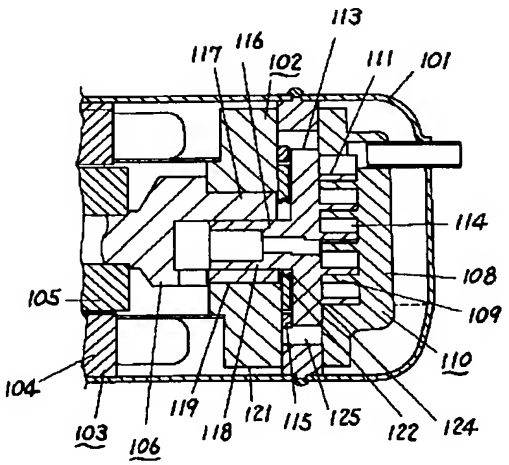

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